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# *Indian Standard*

# SPECIFICATION FOR LOW FREQUENCY, MINIATURE, BAYONET COUPLING CIRCULAR CONNECTORS

## PART 1 TEST SCHEDULE AND REQUIREMENTS

UDC 621·315·683·029 : 42/·53-434·1 : 621·38·038

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NEW DELHI 110002

**Gr 5** *July* 1988

# *Indian Standard*

# SPECIFICATION FOR LOW FREQUENCY, MINIATURE, BAYONET COUPLING CIRCULAR CONNECTORS

## PART 1 TEST SCHEDULE AND REQUIREMENTS

## 0. FOREWORD

**0.1** This Indian Standard was adopted by the Bureau of Indian Standards on 29 October 1987, after the draft finalized by the Connectors for Electronic Equipment Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

**0.2** This standard ( Part 1 ) is one of the Indian Standards on low frequency connectors below 3 MHz including dc used in electronic equipment and shall be used in conjunction with IS : 9647-1986 'General requirements and methods of tests for low frequency connectors below 3 MHz including dc ( *first revision* )'. Subsequent parts of this standard will cover detailed specifications for specific types of connectors.

**0.3** While preparing this standard, assistance has been derived from the following publications:

JSS 50813 (1971) Detail Specification for Connectors, Electrical, Circular, Miniature Bayonet Coupling, issued by the Directorate of Standardization, Ministry of Defence, India.

IEC Pub 130-7 (1971) Connector for frequencies below 3 MHz, Part 7 : Circular multipole connectors with bayonet or push-pull coupling, issued by the International Electrotechnical Commission.

**0.4** For the pnrpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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*Rules for rounding off numerical values ( *revised* ).

## 1. SCOPE

**1.1** This standard ( Part 1 ) specifies the test schedule and requirements applicable to low frequency, miniature, bayonet coupling circular connectors.

## 2. TERMINOLOGY

**2.1** For the purpose of this standard, terms and definitions given in IS : 1885 ( Part 40 )-1974* and IS : 9647-1986† shall apply.

## 3. MATERIALS AND WORKMANSHIP

**3.1** The materials used and workmanship shall be in accordance with **4** of IS : 9647-1986†.

**3.2 Dissimilar Metals** — When dissimilar metals are employed in intimate contact with each other in a connector or in a mated pair of connectors, suitable protection against electrolytic corrossion shall be provided.

**3.3 Non-Magnetic Materials** — All parts shall be made of the materials which are classed as non-magnetic except for hermetically sealed connectors.

**3.4 Contact Materials** — Contacts shall be made of suitable conductive materials. Hoods shall be made of passivated stainless steel. Springs shall be suitably protected or made from non-corrosive materials.

### 3.5 Contact Plating

**3.5.1** *Contact Plating ( Except Solder Contacts )* — Contacts shall be plated in accordance with the applicable drawing ( *see* relevant specification ).

**3.5.2** *Contact Plating ( Solder Contacts )* — Non-removable contacts shall be gold plated to a minimum of 1·27 micrometers over a suitable thickness of copper. Surface plating shall be 95·0 percent gold, minimum of 99 percent purity. Knoop hardness 130-200 inclusive. A soft gold underplating, 99·7 percent gold minimum, Knoop hardness 90 *Max* and 99 percent purity is permitted between copper and hard gold. Accessory members of the female contacts need not be plated, but shall comply with the requirements for dissimilar metals as specified in 3.2.

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*Electrotechnical vocabulary: Part 40 Connectors.

†General requirements and methods of tests for low frequency connectors below 3 MHz including dc ( *first revision* ).

### 3.6 Dielectric Materials

**3.6.1** *Insert and Grommet* — Insert and grommet materials shall be high grade dielectric having hardness, electrical and mechanical characteristics suitable for the purpose intended.

**3.6.1.1** *Rigid* — Rigid dielectric materials shall be of suitable materials to satisfy the requirements of the specification.

**3.6.1.2** *Resilient* — Resilient dielectric materials shall conform to the requirements specified herein. The resilient faces of the connectors must both be designed such that the performance requirements are met, when mated to counterpart connectors.

**3.6.1.3** *Insert faces* — Insert faces, a blanket to a minimum depth of 2·03 mm, shall be resilient within a shore. A range of 35-85 for crimp contact connectors and 65-85 for solder contact connector.

### 3.7 Materials and Finish for Shells, Coupling Rings and Metallic Accessories

**3.7.1** Shells, coupling rings and protective covers shall be made of high grade aluminium alloy.

**3.7.2** Aluminium parts and external screws shall be cadmium plated, except that a preliminary plating of another metal is permissible. The resulting finish shall be olive drab and shall be electrically conductive.

**3.7.3** *Bayonet Pin* — Bayonet pins shall be of stainless steel.

**3.8 Design and Construction** — Connectors and accessories shall be designed and constructed to withstand normal handling incident to installation and maintenance in service. The back end design and configuration of removable crimp contact connectors shall conform to relevant specification. Removable crimp contact connector interchangeability control dimensions shall conform to relevant specification.

**3.8.1** *Contacts* — Contacts shall conform to the requirements of the specification. Contacts shall be so designed that neither the male nor female contact will be damaged during mating of counterpart connectors.

**3.8.1.1** *Solder contacts*—Contact shall conform to the dimensions as given in relevant specification, and shall be non-removable from the insert. Solder cup shall be so designed that during soldering no component will be damaged. A vent hole or equivalent may be provided to prevent air entrapment during soldering.

**3.8.1.2** *Crimp contacts* — Crimp contacts shall be designed to prevent damage to the contact retention device or sealing member during insertion or removal of the contact ( *see* relevant specification ).

**3.8.1.3** *Insertion and removal tool* — The individual contacts shall be positively retained in the connector when installed with the applicable insertion tool. The individual contacts shall be capable of being removed from the connector when using the applicable contact removal tool ( *see* relevant specification ).

**3.8.2** *Insert Design and Construction* — Inserts shall be of voidless construction and secured to prevent rotation within the shell.

**3.8.2.1** *Resilient inserts* — All resilient inserts shall be non-removable from the shell.

**3.8.2.2** *Insert posioning* — Removable inserts shall be keyed to prevent rotation with respect to the shell. Slots and markings for any of the alternate positions, as well as specific details shall be as indicated in the relevant specification.

**3.8.2.3** *Inserts for crimp contact connectors* — The insert and wire sealing grommet or insulating spacer of crimp connectors shall be one integral part and shall permit the removal and re-insertion of individual contacts without damage to the sealing members.

**3.8.2.4** *Contact arrangement* — Contacts shall be arranged in accordance with the applicable specification. All solder cup openings shall be so oriented that they face the terminus of the indexing radius indicated on the drawing and are at right angles to centre line coinciding with the indexing radius.

**3.8.2.5** *Contact spacing* — Minimum nominal centre-to-centre spacing and minimum dielectric thickness, contact to shell, or contact-to-contact shall be in accordance with the value shown below:

| *Connector Class* | *Contact Size* | *Service Rating I* | | | *Service Rating II* | | |
|---|---|---|---|---|---|---|---|
| | | Centre to Centre | Insert | | Centre to Centre | Insert | |
| | | | Rigid | Resilient | | Rigid | Resilient |
| E and F | 20 | 3·30 | 0·15 | 0·20 | 4·11 | 0·20 | 0·30 |
| | 16 | 4·27 | | | 4·83 | | |
| | 12 | 5·21 | | | 5·84 | | |

**3.8.2.6** *Contact alignment*—Inserts for female contacts shall provide an overall side-play of the female contacts of 0·063 to 0·187 mm from the required position to facilitate alignment with mating male contacts.

**3.8.3** *Shell Design* — The connector shells shall be seamless and shall retain their inserts in a positive manner. The shells for the connectors shall be designed to accept and retain a cable support or other accessories as given in the relevant specification. Connectors shall be designed in such a manner as to incorporate a static peripheral seal located within the sockets.

**3.8.3.1** *Engagement of connectors*—Counterpart connectors of any arrangement and accessories shall be capable of being fully engaged and disengaged without the use of tools. Engagement of the connectors shall be defined as full insertion of male contact into female contact and proper sealing of the mating insert faces. Full engagement shall be indicated by an audible sound at the completion of coupling cycle, and a positive detent shall be included in the coupling mechanism to lock connectors in the engaged position.

**3.8.3.2** *Coupling*—Connectors shall be coupled to counterpart connectors by means of bayonet coupling ring. Coupling shall be accomplished by clockwise rotation of the coupling ring; uncoupling by counter clockwise rotation The bayonet coupling ring shall be knurled to provide a gripping surface. Coupling pins on the socket shall have end surfaces of contrasting colour to the coupling ring. The ends of the pins shall be visible through suitable holes in the coupling rings when the connectors are fully engaged and the coupling ring is in the locked position.

**3.8.3.3** *Shell polarization* — Polarization of connectors shall be accomplished by matched integral key(s) and keyway(s) of counterpart connectors. The polarization of counterpart connectors shall take place before coupling rings are engaged and before any male contact can touch the opposing insert face or female contact of the counterpart connectors.

**3.8.3.4** *Lubrication* — Bayonet coupling slots and accessory threads of the connectors shall be coated with a suitable lubricant.

**3.8.3.5** *Engagement seal* — Connectors shall contain sealing means so that engaged connectors comply with the requirements specified herein. The design of the seal shall be such that, in mated connectors all air paths between adjacent contacts and between contacts and shell are eliminated. There shall be interfacial mating of the engaged connector insert to provide dielectric ( insert ) under compression of 0·127 mm minimum.

**3.8.3.6** *Protective covers and stowage sockets* — When mated to counterpart connectors, the protective covers and stowage sockets shall maintain the connector free of moisture, prevent air leakage and comply with the applicable requirements of this specification.

**3.8.4** *Wire Sealing* — Class E and F connectors shall be provided with a wire-sealing resilient grommet and gland nut, capable of sealing on wires of the sizes specified in wire range accommodation ( *see* **3.8.4.1** ).

**3.8.4.1** *Wire range accommodation* — The wire range given below shall be accommodated by the connectors class E and F.

*Wire Range Accommodation*

| *Wire Barrel Size* | *Wire Dia* (mm) | *OD of Finished Wire* | |
|---|---|---|---|
| | | *Min* (mm) | *Max* (mm) |
| 20 | 0·50<br>0·63<br>0·80 | 1·19*<br>( *See* Note ) | 2·11 |
| 16 | 0·80<br>1·00<br>1·25 | 1·68 | 2·62 |
| 12 | 1·60<br>2·00 | 2·46 | 4·01 |

NOTE — Minimum OD for solder contact connectors is 1·52 mm.

a) *Solder contact connectors* — Class E solder contact connectors shall be provided with a removable resilient grommet and retaining feature. The grommet shall be designed to fit firmly against the rear face of the insert and around each contact and wire termination so that any air path from each contact termination to all other terminations and the shell is interrupted by dielectric material under compression of 0·127 mm minimum.

b) *Crimp contact connectors* — Crimp contact connectors shall be provided with an integral insert and grommet.

**3.8.4.2** *Grommet sealing plugs*—The grommets of class E and F connectors shall be designed to accept sealing plugs in lieu of wires where unwired contacts are employed.

**3.8.5** *Interchangeability and Intermateability*

**3.8.5.1** *Interchangeability* — All connectors and accessories shall be completely interchangeable with each other with respect to installation and performance specified herein.

**3.8.5.2** *Intermateability*—Connectors conforming to this specification shall be intermateable. When different types of connectors ( front or rear release ) or different types of contacts ( crimp or solder ) are used in mated pair of connectors, the minimum performance requirements ( temperature sealing, etc ) must be met.

## 4. TYPE DESIGNATION

**4.1** The insert is identified by a code letter as shown below:

| *Insert* | *Code Letter* |
|---|---|
| Insert with male contacts | M |
| Insert with female contacts | F |

**4.2** A connector according to this standard shall be designated by:

a) Reference to this Indian Standard;
b) The letters IS representing Indian Standard;
c) A number denoting the type of connector;
d) A number denoting the variant which indicate shell size, insert arrangement number and type of insert; and
e) A letter denoting the type of contact.

**4.3** The type designation shall be given in accordance with **4.2**. For example:

X X X X IS – Y Y – Z Z – M/F

where

X X X X represents the reference number of Indian Standard (IS);

Y Y denotes the number allotted to the type of connector;

Z Z denotes the variant for denoting shell size, etc; and

M/F denotes the insert with male contacts/female contacts.

## 5. MARKING

**5.1** The connectors shall be marked in accordance with **6** of IS : 9647-1986*.

## 6. CLIMATIC CATEGORY

**6.1** The climatic category shall generally be chosen in accordance with **3** of IS : 9647-1986*.

**6.2** The climatic category of a particular connector shall be specified in the relevant specification.

## 7. ELECTRICAL RATINGS

**7.1** The rated voltage and rated current shall be specified in the relevant specification.

## 8. TESTS

**8.1 General** — The test schedule specifies the tests, the order in which they shall be carried out and the requirements to be met.

**8.2 Conditions of Tests** — The provisions of **8** of IS : 9647-1986* shall apply.

**8.3 Classification of Tests** — The provisions of **7** of IS : 9647-1986* shall apply.

**8.4 Test Schedule**

**8.4.1** *Type Tests* — The test schedule for type tests the sequence of tests and the number of samples shall be as specified in Table 1.

**8.4.2** *Routine Test* — The following tests shall be carried out in the order stated:

a) Visual examination ( *see* **9** of IS : 9647-1986* ); and
b) Voltage proof ( duration 5 seconds ) ( *see* **12.5** of IS : 9647-1986* ).

**8.4.3** *Acceptance Tests* — Two groups of samples ( Group A and Group B ) shall be selected preferably at random from the lot that has passed routine tests stated in **8.4.2**. Each group of connectors shall be subjected to the tests in the sequence given in Table 2.

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*General requirements and methods of tests for low frequency connectors below 3 MHz including dc ( *first revision* ).

*General requirements and methods of tests for low frequency connectors below 3 MHz including dc ( *first revision* ).

### TABLE 1 SCHEDULE OF TYPE TESTS

( *Clause* 8.4.1 )

| TEST | CL REF OF IS : 9647-1986* | CONDITIONS OF TEST | REQUIREMENTS |
|---|---|---|---|
| 1. All Samples ( 22 Samples ) | | | |
| a) Visual examination | 9 | — | — |
| b) Dimensions | 10 | — | — |
| c) Polarization | 13.14 | — | — |
| i) Polarizing device | 13.14.1 | — | — |
| ii) Mismating | 13.14.2 | Force : 113·5 N ( *Max* ) | — |
| iii) Orientation | 13.14.3 | — | — |
| d) Insertion and withdrawal force | 14.1 | Protective covers shall also be engaged and disengaged with their counterparts | *See* Appendix A |
| e) Magnetic permeability | 12.11 | — | The relative magnetic permeability shall be less than 2·0 |
| f) Low level circuit | B-2 | — | — |
| g) Contact resistance | 12.1 | — | *See* Appendix B |
| h) Voltage proof | 12 5 | *See* Appendix C | — |
| j) Insulation resistance | 12.4 | 500 ± 50 V | 5 000 MΩ (*Min*) |
| k) Sealing ( solder type fixed connectors only ) | 16.5 | Type of seal : A duration of exposure at −55°C : 30 min, conditioning 20 N/cm$^2$ | Air leakage 16 cm$^3$/h (*Max*) |
| 2. First Group ( 6 Samples ) | | | |
| a) Dimensions and mass | 10 | — | — |
| b) Soldering | 13.15 | — | — |
| c) Maintenance ageing | 13.4 | — | — |
| d) Contact insertion and removal force | 13.5 | Appropriate tool shall be used | The contact insertion and removal force shall not exceed the values given belew:<br>*Contact Size* *Force*<br>20 90 N<br>16 90 N<br>12 135 N |
| e) Impact ( bump ) | 14.11 | 4 000 bumps, 40 g and duration 6 ms | — |
| i) Contact resistance | 12.1 | — | *See* Appendix B |
| ii) Sealing | 16.5 | *See* 1(k) above | *See* 1(k) above |
| iii) Visual examination | 9 | — | — |
| f) Vibration | 14.13 | 10 to 2 000 Hz 0·75 mm or 500 m/s$^2$, duration 10 h | — |
| i) Visual examination | 9 | — | — |
| ii) Contact resistance | 12.1 | — | *See* Appendix B |
| iii) Sealing | 16.5 | *See* 1(k) above | *See* 1(k) above |
| g) Impact ( shock ) | 14.12 | 500 m/s$^2$ | — |
| i) Visual examination | 9 | — | — |
| ii) Contact resistance | 12.1 | — | *See* Appendix B |
| iii) Sealing | 16.5 | *See* 1(k) above | *See* 1(k) above |
| h) Acceleration ( steady state) | 14.10 | 500 m/s$^2$ | — |
| i) Visual examination | 9 | — | — |
| ii) Contact resistance | 12.1 | — | *See* Appendix B |
| iii) Sealing | 16.5 | *See* 1(k) above | *See* 1(k) above |

*General requirements and methods of test for low frequency connectors below 3 MHz including dc ( *first revision* ).

( *Continued* )

**TABLE 1 SCHEDULE OF TYPE TESTS** – *Contd*

| TEST | CL REF OF IS : 9647-1986* | CONDITIONS OF TEST | REQUIREMENTS |
|---|---|---|---|
| j) Rapid change of temperature | 16.4 | – 55°C to 125°C | — |
| k) Dry heat | 16.2.1 | 125°C | — |
| i) Visual examination | 9 | — | — |
| ii) Insulation resistance | 12.4 | 500 ± 50 V | 50 MΩ (*Min*) |
| m) Damp heat, accelerated ( first cycle ) | 16.2.2 | One cycle | — |
| i) Visual examination | 9 | — | — |
| n) Cold | 16.2.3 | – 55°C | — |
| i) Visual examination | 9 | — | — |
| p) Low air pressure | 16.2.4 | 1·0 kPa | — |
| i) Voltage proof | 12.5 | *See* Appendix C | — |
| q) Damp heat accelerated ( remaining cycle ) | 16.2.5 | Five cycles | — |
| i) Low level circuit | B-2 | — | — |
| ii) Contact resistance | 12.1 | — | *See* Appendix B |
| iii) Voltage proof | 12.5 | — | — |
| iv) Insulation resistance | 12.4 | 500 ± 50 V | 100 MΩ (*Min*) |
| v) Insertion and withdrawal force | 14.1 | *See* 1(d) above | *See* Appendix A |
| vi) Sealing | 16.5 | *See* 1(k) above | *See* 1(k) above |
| vii) Visual examination | 9 | — | — |
| r) Probe damage test | 13.1.2 | *See* Appendix D | – |
| i) Visual examination | 9 | — | — |
| ii) Insertion and withdrawal force | 14.1 | *See* 1(d) above | *See* Appendix A |
| s) Immersion in fluid | 16.5.5.1 | As specified, except voltage proof test shall not be applied | Connectors shall engage and disengage satisfactorily |
| t) Insert retention ( in shell ) | 14.7 | The following details and exception shall apply:<br>a) The pressure rate shall be 69 kPa/s<br>b) The insert shall retain the pressure for 5 seconds<br>c) Effective differential pressure 500 kPa | The insert shall not be dislodged from their original position or damaged |
| u) Contact retention ( in insert ) | 14.4 | *See* Appendix E | *See* Appendix E |
| 3. Second Group ( 4 samples ) | | | |
| a) Damp heat ( long term exposure ) | 16.3 | Duration 21 days | — |
| i) Contact resistance | 12.1 | — | *See* Appendiz B |
| ii) Voltage proof | 12.5 | *See* Appendix C | — |
| iii) Insulation resistance | 12.4 | 500 ± 50 V | 100 MΩ (*Min*) |
| iv) Sealing | 16.5 | *See* 1(k) above | *See* 1(k) above |
| v) Visual examination | 9 | — | — |
| 4. Third Group ( 4 samples ) | | | |
| a) Mechanical endurance test | 17 | As specified. Counterpart connectors shall be mated and unmated 500 times at a maximum rate of 200 ± 100 cycles/hour with coupling rings operated in a manner to simulate actual service | — |

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*General requirements and methods of tests for low frequency connector, below 3 MHz including dc (*first revision*).

( *Continued* )

**TABLE 1 SCHEDULE OF TYPE TESTS**— *Contd*

| TEST | CL REF OF IS : 9647-1986* | CONDITION OF TEST | REQUIREMENTS |
|---|---|---|---|
| i) Contact resistance | 12.1 | — | *See* Appendix B |
| ii) Insertion and withdrawal force | 14.1 | *See* 1(d) above | *See* Appendix A |
| iii) Visual examination | 9 | — | — |
| b) Electrical endurance test | 18 | 1 000 h at 85°C without current flowing or on separate samples 250 h at 125°C without current flowing | — |
| i) Insulation resistance at high temperature | 12.4 | — | 50 MΩ *(Min)* |
| ii) Voltage proof | 12.5 | *See* Appendix C | — |
| iii) Contact resistance | 12.1 | — | *See* Appendix B |
| iv) Insulation resistance | 12.4 | 500 ± 50 V | 500 MΩ (*Min*) |
| v) Sealing | 16.5 | *See* 1(k) above | *See* 1(k) above |
| vi) Visual examination | 9 | — | — |
| 5. Fourth Group ( 2 Samples ) | | | |
| a) Mould growth | 16 6 | — | — |
| 6. Fifth Group ( 2 samples ) | | | |
| a) Salt mist | 16.7 | — | — |
| i) Low level circuit | B-2 | — | — |
| ii) Contact resistance | 12.1 | — | *See* Appendix B |
| iii) Voltage proof | 12 5 | *See* Appendix C | — |
| iv) Insulation resistance | 12.4 | — | 100 MΩ (*Min*) |
| v) Insertion and withdrawal force | 14.1 | *See* 1(d) above | *See* Appendix A |
| vi) Visual examination | 9 | — | — |
| 7. Sixth Group ( 2 Samples )† | | | |
| a) Visual examination | 9 | — | — |
| b) Dimensions | 10 | — | — |
| c) Insertion and withdrawal force | 14.1 | *See* 1(d) above | *See* Appendix A |
| d) Dry heat | 16.2.1 | Repeat the test as given in 2(k) above | |
| e) Damp heat, accelerated ( first cycle ) | 16.2.2 | Repeat the test as given in 2(m) above | |
| f ) Cold | 16.2.3 | Repeat the test as given in 2(n) above | |
| g) Low air pressure | 16.2.4 | Repeat the test as given in 2(p) above | |
| h) Damp heat accelerated ( remaining cycles ) | 16.2.5 | Repeat the test as given in 2(q) above | |
| j) Cover chain tensile strength | 13.10 | — | — |
| 8. Seventh Group ( 2 samples )† | | | |
| a) Salt mist | 16.7 | Repeat the test as given in 6(a) above | |
| b) Cover chain tensile strength | 13.10 | — | — |

*General requirements and methods of tests for low frequency connectors below 3 MHz including dc ( *first revision* ).

†Sixth and Seventh Group are applicable to protective cover and chain assemblies only and during acceptance shall be considered as Group B tests.

## TABLE 2 SCHEDULE OF ACCEPTANCE TESTS

( *Clause* 8.4.3 )

| Test | Cl Ref of IS : 9647-1986* | AQL (Percent Defective) | Inspection Level† | *D/ND*‡ |
|---|---|---|---|---|
| *GROUP A* | | | | |
| Insertion & withdrawal force | 14.1 | 1 | II | ND |
| Low level circuit | B-2 | | | |
| Contact resistance | 12.1 | | | |
| Insulation resistance | 12.4 | | | |
| Sealing | 16.5 | | | |
| *GROUP B* | | | | |
| *Sub-group* 1 | | | | |
| Dimensions | 10 | 4 | S-3 | ND |
| *Sub-group* 2 | | | | |
| Mechanical endurance test | 17 | 4 | S-3 | ND |
| Electrical endurance test | 18 | | | |
| *Sub-group* 3 | | | | |
| Maintenance ageing | 13.4 | 4 | S-3 | D |
| Contact insertion and removal force | 13.5 | | | |
| Soldering | 13.15 | | | |
| Bump | 14.11 | | | |
| Climatic sequeuce | 16.2 | | | |
| Insert retention (in shell) | 14.7 | | | |
| Contact retention (in insert) | 14.4 | | | |

Note — Samples which have been subjected to destructive tests shall not be returned to the lot.

*General requirements and methods of tests for low frequency connectors below 3 MHz including dc ( *first revision* ).

†Sampling plans and procedures for inspection by attributes for electronic items ( *under preparation* ).

‡*D*=destructive and *ND*=non-destructive.

# APPENDIX A

## ( *Table* 1 )

## INSERTION AND WITHDRAWAL FORCE

**A-1. REQUIREMENTS** — As specified. The values shall be not more than that specified below:

| *Shell Size* | *Torque* ( Nm ) | |
|---|---|---|
| | Engagement and Disengagement Force (*Max*) | Disengagement Force (*Min*) |
| 8 | 0·90 | 0·112 |
| 10 | 1·35 | 0·112 |
| 12 | 1·80 | 0·225 |
| 14 | 2·25 | 0·45 |
| 16 | 2·70 | 0·45 |
| 18 | 3·15 | 0·45 |
| 20 | 3·6 | 0·67 |
| 22 | 4·05 | 0·78 |
| 24 | 4·95 | 0·78 |

# APPENDIX B

( *Table* 1 )

## CONTACT RESISTANCE

**B-1. CONDITION OF TEST** — As specified test current shall be as given below and the voltage drops shall not exceed the specified values:

| *Contact Size* | *Wire Dia* (mm) | *Test Current* (A) | *Initial Drop* (mV) | *Succeeding Measurements Drop* (mV) |
|---|---|---|---|---|
| 12 | 2 | 23 | 50 | 60 |
| | 1·6 | 17 | 45 | 55 |
| 16 | 1·25 | 13·0 | 50 | 60 |
| | 0·8 | 7·5 | 45 | 55 |
| 20 | 0·8 | 7·5 | 55 | 65 |
| | 0·5 | 3·0 | 54 | 55 |

# APPENDIX C

( *Table* 1 )

## VOLTAGE PROOF

**C-1. CONDITION OF TEST** — As specified unmated connectors shall be tested as shown below:

The applicable test voltage shall be applied between all adjacent contacts and between the shell and each peripheral contact. If an insert possesses more than one service rating, similar connections shall be made for the different test voltage as necessary.

| *Altitude* (m) | *Working Voltage* ( *Max* ) | | *Minimum Test Voltage* V ac ( rms ) | |
|---|---|---|---|---|
| | Service Rating I | Service Rating II | Service Rating I | Service Rating II |
| Sea level | 600 | 1 000 | 1 500 | 2 300 |
| 16 000 | — | — | 500 | 750 |
| 20 000 | 300 | 450 | 375 | 500 |
| 31 000 | — | — | 200 | 200 |

# APPENDIX D

( *Table* 1 )

## PROBE DAMAGE TEST

**D-1. CONDITION OF TEST**—A test prod shall be inserted into each socket contact to the depth shown below, and the applicable bending moment applied. The removable contacts shall be suitably supported to prevent bending, but the support shall not reinforce the pressure member. The test prod shall consist of a hardened steel pin having a diameter equal to the nominal dimensions of the mating pin contact and a spherical radius tip. The test prod shall be free and unsupported, and the socket contact shall be maintained in a horizontal position. For each specified depth, the contact shall be rotated one complete revolution at a uniform rate.

**Depth of Insertion and Bending Moment**

| *Contact Size* | *Depth of Insertion* | | | *Bending Moment* ± 10% |
|---|---|---|---|---|
| | 1/2 | 3/4 | Full | |
| 12 | — | × | × | 0·223 Nm |
| 16 | × | × | × | 0·223 Nm |

× indicates applicable.

# APPENDIX E

( *Table* 1 )

## CONTACT RETENTION ( IN INSERT )

**E-1. CONDITION OF TEST** — As specified. An axial load, as specified below, shall be applied at a rate of 450 g/s until the specified load has been reached. A minimum of 20 percent, but not less than three of the contacts in each connector shall be tested. Axial load shall be applied to individual contacts.

*Axial Load for Contact Retention*

| Contact Size | Axial Load in kg |
|---|---|
| 20 | 6·8 |
| 16 | 11·35 |
| 12 | 11·35 |

**E-1.1 Solder Contact Connectors**—Connectors shall be tested as specified above, except that the specified load shall be maintained for a minimum period of 5 seconds and then removed. The contact displacement shall then be measured from the connector shell.

**E-1.2 Crimp Contact Connectors**—Connectors shall be tested as above, except that an initial load of 900 g shall be applied to assure that all slack between the contact and the retention device has been taken up, before measuring contact displacement. Displacement shall then be measured from the connector shell with the contact under load, after the load has been applied for a minimum of 5 seconds.

**E-2. REQUIREMENTS** — The contacts shall be retained in their inserts when subjected to the loads. The axial displacement shall not exceed as given below:

a) *Solder Contact Connectors* — 0·3 mm with respect to the shell, within one minute, after the load has been removed.

b) *Crimp Contact Connectors* — 0·30 mm with respect to the shell, while under load with the accessories tightened or 0·37 mm while under load, with accessories removed.

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